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7/31/97

PRELIMINARY DESIGN SUBMITTAL
ACCRA PAC/WARNER BAKER SITE
CONSENT DECREE
CIVIL ACTION NO. H89-0113

JULY 31, 1997

PREPARED FOR
ACCRA PAC, INC. AND
THE ESTATE OF WARNER BAKER

EPA Region 5 Records Ctr.
283176

PREPARED BY
EIS ENVIRONMENTAL ENGINEERS, INC
1701 NORTH IRONWOOD DRIVE
SOUTH BEND, INDIANA 46635

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1.0 INTRODUCTION

This Preliminary Design Submittal is submitted in accordance with the provisions of Civil Action no. N89-0113, Consent Decree lodged with the United States District Court for the Northern District of Indiana, South Bend Division. More specifically, it is the document to be submitted by Accra Pac, Inc., pursuant to Paragraph 11.d of the Consent Decree and Paragraph II(B)(4) of the Scope of Work.

1.1 Site Description

The Site is located at 2626 Industrial Parkway and covers approximately 2.3 acres in the Northeast 1/4 of the Southwest 1/4 of Section 2, Township 37 North, Range 5 East, Concord Township, Elkhart, Indiana.

Prior to 1962 the Warner Baker/Accra Pac Site (the Site) was cultivated farmland. Aerial photographs of the Site area taken in 1958 and provided by Airmaps, Inc., of Elkhart, Indiana, indicate that the Site was farmland with a pond and situated between two grass runways of a small airport. The aerial photographs indicate that the airport structures and plane parking were located off of the Site near the intersection of Middlebury Street and Middleton Road. The U.S. Geological Survey 1961 Topographic Quadrangle of Elkhart, Indiana, identified the runways as part of the East Side Airport.

According to records at the Elkhart County Recorder's office, Barbara and John Best purchased a large parcel of land, which included the Site, from Robert Collins in October 1962.

In July 1963, Middleton Run Industrial Acres, Inc., (Barbara and John Best, President) purchased properties from Barbara and John Best which included the Site. In December 1963, Middleton Run Industrial Acres, Inc., officially subdivided the properties and dedicated Industrial Parkway to public use. The platted subdivision, which included the future Accra Pac Site, was Lot 2 (279,000 ft^2, ≈6.4 acres) of the Middleton Run Industrial Acres.

Accra Pac, Inc., operated a contract packaging facility from 1968 to 1975 at 2626 Industrial Parkway. This address corresponds with the portion of Lot 2 that was purchased by Accra Pac, Inc., from Middleton Run Industrial Acres, Inc., in 1967. The packaging plant operated by Accra Pac, Inc., was destroyed by an explosion and fire in January 1976. The property was purchased by Warner P. Baker on December 31, 1976. At that time, the structures on the 220-foot-by-40-foot parcel included a concrete building slab with 3 loading docks, several small concrete pads adjacent to the building slab and 13 underground storage tanks.

1.2 Site Contaminants

Both soil and groundwater contamination exist on the Site. The nature and extent of that contamination were described in detail in the "Report of Investigation of Contamination at the Warner P. Baker/Accra Pac Site, Elkhart, Indiana," dated September 1990 (1990 Report)(EIS, 1990). The results of subsequent sampling of 16 monitoring wells, completed in January 1994, and the results of subsequent study of the multi-component residuals (MCR) identified in the 1990 Report are included in the discussions below.

The Report indicated the presence of "multi-component residuals" (MCR). These compounds appeared to be two different categories of **petroleum hydrocarbons**. Ethylbenzene, Toluene and Xylene were found in samples containing MCR and in samples where no MCR were present. No relationship between these aromatics and the MCR was evident. The report stated that the MCR, containing only cyclohexanes, straight and branched chain alkanes, were not viewed as a contaminant of major environmental concern.

Approximately 5300 cubic yards of contaminated soil have been identified in the vadose zone on the Warner Baker property, and 240 cubic yards on the adjoining property, which is owned by ADEC. The contaminated soil on the ADEC property has been excavated and moved to the Warner Baker property for treatment. Total soil target VOC concentrations range from non-detectable to 4280 ppm. Total halogenated compound concentrations range from non-detectable to 74.4 ppm, total chlorofluorocarbon concentrations range from non-detectable to 2.6 ppm, and total aromatic hydrocarbon compound concentrations range from non-detectable to 4280 ppm. Soil concentrations of MCR in the vadose zone range from non-detectable to 4560 ppm. The clean-up performance standard as established in the Consent Decree is a reduction of the total of the concentration of the 15 Volatile Organic Compounds identified in the 1990 Report to 1 ppm.

A plume of contaminated groundwater with an areal extent of approximately seven acres extends beneath most of the Site and five to six hundred feet downgradient. Depth to groundwater is approximately nine feet and contamination extends vertically from the water table to 70 feet below grade. Data from the 1990 Report indicated that total target VOC concentrations ranged from 0.057 ppm to 387 ppm. Total halogenated compound concentrations ranged from 0.045 ppm to 134 ppm, total chlorofluorcarbon concentrations ranged from 0.006 ppm to 178 ppm, and total aromatic hydrocarbon compound concentrations ranged from 0.006 ppm to 74.7 ppm. The cleanup performance standard as set forth in the Consent Decree is a 95% reduction of the baseline concentration of total target Volatile Organic Compounds at each compliance point.

1.3 Treatability Study

A Treatability Study was done in 1990. This Study summarized the results of the development and detailed analysis remedy alternatives completed by EIS at that time. Six alternatives were identified for the Site. Those alternatives consisted of various combinations of one of three groundwater remediation technologies. Preliminary cost estimates were provided for most of the alternatives. The Treatability Study was revised and updated in 1996. This revised study evaluates the technologies identified in the 1990 Report (EIS, 1990) in light of any intervening technical advances and identifies additional technologies which may not have been developed or well documented in 1990 but now show promise for sites such as the Warner Baker/Accra Pac Site. After prescreening, a short list of technologies was developed. These technologies were included on an updated list of remedy alternatives which were assembled and evaluated. A single remediation alternative was then selected.

2.0 DESIGN CRITERIA

The primary design of the remediation system for the Warner Baker/Accra Pac site is based on the soil and groundwater cleanup criteria set forth in the Consent Decree. The cleanup criterion for groundwater is a 95% reduction in contaminants based on equivalent VOC levels from the Baseline Groundwater Monitoring event conducted September 30, 1996. The Consent Decree also requires cleanup of soil contaminants to 1 ppm. The Consent Decree also allows the Defendants to petition the EPA to allow the discontinuance of the soil treatment. This action could occur if the monitoring data indicate that the soil contamination is no longer a contributing factor to the groundwater contamination.

Soil contamination is the primary source and pathway by which the contamination enters the groundwater. Some remediation activities have been completed to address this aspect of the contamination. Thirteen underground storage tanks and their contents were removed in December of 1986. About that time some of the most contaminated soils were also removed. The remediation required by the Order will reduce the remaining contaminants in the soil. All of the contaminated soil that was identified offsite (ADEC property) has been relocated to the Site for treatment.

Groundwater is the principle concern of the cleanup. This effort will be more effective if the contaminant sources in the soil eliminated first.

3.0 RESULTS OF TREATABILITY STUDIES

The site characterization identified fifteen contaminants. These contaminants include chlorinated and fluorinated hydrocarbons, aromatic hydrocarbons and petroleum hydrocarbons characterized as multi-component residuals. Contaminants exist in the vadose zone, in the saturated or smear zone above the water table and dissolved in groundwater. A number of available technologies were examined in the treatability study. No single technology was determined to be effective in remediating the variety of contaminants in the soil and groundwater at this site. It will take a combination of technologies to remediate this site.

The treatability study identified both in-situ bioventing and soil vapor extraction (SVE) as viable technologies for dealing with soil contaminated with hydrocarbons. In practice both methods employ the same physical mechanisms for operation. They actually take place concurrently, combining the benefits from each. SVE will remove chlorinated VOCs from the soil as well. Such a system can be designed to limit VOC emissions below action levels while maintaining an acceptable rate of remedial activity.

Treatment of the saturated zone is best accomplished by use of sparging. Sparging also has two remediation mechanisms, biological reduction of hydrocarbons and stripping of VOCs including chlorinated compounds. Such a system should be combined with a vapor extraction system to prevent the pressure, which is introduced underground, from possibly spreading the contamination. Biosparging/sparging is also effective as an in-situ method of treating groundwater; however, the literature indicates that there is a limit to the depth at which it can be employed. The reasons for this limit are not clear, perhaps in the highly porous soils of this site it may be possible to expand its use to greater depths.

The treatability study recommended that groundwater remediation would include biosparging and air sparging to address contaminants in the upper level of the aquifer which would be followed by groundwater extraction, air stripping and reinjection to provide treatment of contaminated groundwater not accessible to sparging.

The treatability study that was performed and submitted to the EPA for this site covers a large volume of information. Refer to the Treatability Study for additional information regarding the selection of remediation technologies.

4.0 RESULTS OF ADDITIONAL FIELD SAMPLING AND PREDESIGN WORK

The Warner Baker site has been extensively tested. It is EIS's opinion that no additional data are required to execute the design of the bioventing/SVE and biosparging/sparging remediation system. Some of the available groundwater data from previous studies have been recompiled to make them more useful in the design effort. The new compilation is reflected in the drawings that are part of this submittal. Additional data will be developed as a byproduct of the installation of the remediation systems. The new format will facilitate incorporating these data into the site maps.

The combination of methods to be used in the remediation and the sequence of their execution will allow operating practice and equipment adjustments to be made based on actual performance and results as the remediation process advances from step to step. The interaction between the methodologies to be employed is a stronger influence on the design parameters to be used than are the traditional site-specific tests employed when a single technology is to be used. This reasoning will be explained in more detail in the section on project design strategy.

5.0 PROJECT DESIGN STRATEGY

The treatability study showed that several different technologies will be needed to address the variety of contaminants and affected media that are present on this site. By using these technologies in the proper sequence, and at times concurrently, it will not only reduce the overall cleanup effort but will also increase the effectiveness of the individual methods.

The overall strategy for the remediation effort is to remediate the soil contamination before remediating the groundwater. This will reduce the amount of contamination entering the groundwater and give priority to methods that remove the contaminants in greater quantities. Stripping contaminants from extracted groundwater is very inefficient in terms of the effort involved per unit of contaminant removed because the solubility of some of the contaminants is so low. The proposed strategy will minimize the time required for the remediation effort.

The contaminated area in the unsaturated soils is defined by Figure 4.3 from the 1990 EIS Study. Drawing 3.1.0 in Appendix A is based on that Figure. The initial remediation will concentrate on the area identified in Figure 4.3 to remove the primary sources of contamination. The first step will be the installation of a bioventing/soil vapor extraction system. The wells in the system will be arranged to enclose the source area. This will be used to confine the possible travel of contaminants underground during the later sparging phases. Other wells will be positioned at the points of highest concentration. All of the wells will be connected to a manifold system, and will be valved so that they can operate either under vacuum or be used as passive air inlets. Experience with vapor extraction systems shows that this offers several advantages.

- Points of equal pressure potential create no flow areas that exist between each group of wells. This results in dead spots which are unaffected by the remediation effort. Turning wells on and off varies the location of these points so that the entire area is affected.
- Combining contaminated wells varying contaminant concentrations allows the system operator to control the VOC emissions level.
- Wells produce better when they are allowed to "rest" intermittently. By using valves on individual wells rather than shutting down the system to achieve this, the above benefits can be realized and a smaller vacuum pump system can be used.

Initially, the system will be operated in a mode most compatible with bioventing. This will also allow the control of VOC emissions within regulated levels by reducing the speed of the vacuum blower and, if necessary, mixing the combination of wells on vacuum. Vacuum systems produce the highest levels of VOC emissions during initial operation, but the rate falls rapidly. The system will be controlled to shave this initial peak. The overall objective of this phase is to allow in-situ bacteria to consume as much of the contaminants as possible. The continuous supply of oxygen contained in the flow of air induced by the vacuum pump enhances this process. Keeping localized flow rates low is also beneficial. This can be accomplished by keeping a sufficient number of wells under vacuum at all times.

Monitoring the vacuum system performance is simple. Extraction of VOCs is usually detectable by odor or field instruments. Samples can be collected on carbon tubes for quantification and speciation when necessary. Biological activity can be detected by depressed oxygen levels in the vapors extracted. Experience has shown that this is a more reliable measure than monitoring carbon dioxide levels or attempting to use the combination of oxygen and carbon dioxide to calculate respiration. So long as these indicators show that these processes are active, they will be the primary remediation methods.

The operation of the bioventing/SVE system is limited by climatic conditions. System operation is hampered by freezing conditions to the point that the equipment can be damaged. The principle cause is that water vapor drawn from underground freezes in pipes and equipment. Although this condition can be overcome by heat tracing, the introduction of cold air to the subsurface environment will deter rather than enhance biological activity. Therefore, the system will not be operated when average daily temperatures are consistently below freezing.

When the monitored parameters indicate that the effectiveness of the bioventing/SVE system has diminished, a biosparging/air sparging system will be added to the remediation area. The sparging system will introduce air bubbles below the level of the groundwater. The primary target of this system is the smear zone where much of the contamination is accumulated. The sparging system will operate in conjunction with the SVE system. Although these systems are often used separately, when used together they enhance each other's effectiveness. The bubbles introduced by the sparging system will travel vertically under the influence of gravity unless they encounter physical barriers or pressure gradients that alter their course. When the bubbles reach the unsaturated soil, they release air that is in turn drawn to the SVE wells. This creates new paths through the soil to help deliver oxygen to the in-situ bacteria and remove more contaminants. The paths created by the SVE system when operating alone are from the surface or from adjacent SVE wells, which are currently being operated in the passive mode to the extracting well points. The emergence of the bubbles from below provides entirely new pathways through which the bioventing/SVE system can draw air, increasing its area of influence. During this period, the bioventing/ SVE system will operate at higher capacity to assure capture of any VOC emissions of the biosparging/air sparging system and prevent the possible spread of contaminants. Air emissions will remain low because the higher levels of VOCs will already have been diminished from the bioventing/vapor extraction phase.

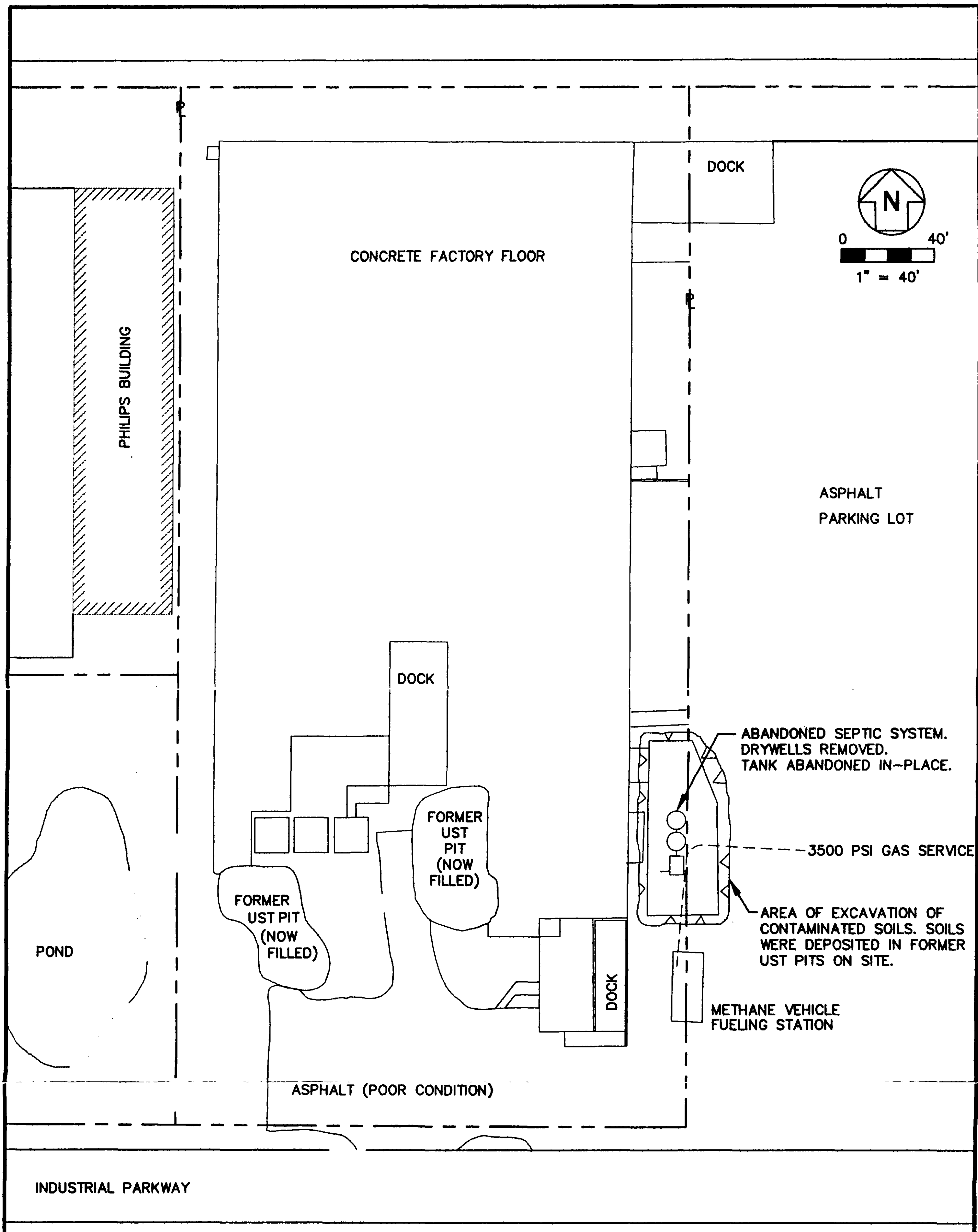
Monitoring for biosparging/air sparging will be the same as for the bioventing/SVE since most of the gases leaving the sparging system will be captured by the SVE system. VOCs and oxygen levels can be monitored as described above to determine the effectiveness of the remediation effort.

When the effectiveness of the bioventing/SVE and biosparging/air sparging systems has been exhausted, the direct treatment of groundwater will begin. This will be a pump and treat system, but several operating modes may be employed depending on the remediation needs of the site at that time. The main variable in selecting an operating mode will be the effectiveness of the previous treatment. If further soil remediation is needed, the pump and treat system will be located to prevent the spread of contamination. If the smear zone needs further treatment, the pump and treat system may be combined with the SVE operation using well locations designed to lower the water table so that the SVE system can access the contamination. If neither of the above are required, the pump and treat system will be designed to prevent contaminated groundwater from leaving the site.

Because of the issues discussed above, the design of the pump and treat remediation system will not be included with the current Engineering Design Submittal for soil remediation. The groundwater Engineering Design Submittal will be completed after data have been obtained to evaluate the effectiveness of the soil remediation effort.

APPENDIX A

CONTAMINANT MAPS



EIS ENVIRONMENTAL ENGINEERS, INC.

1701 North Ironwood Dr. . South Bend, IN 46635
Tele. (219) 277-5715 Fax. (219) 272-1376

SITE PLAN

ACCRA PAC – WARNER BAKER SITE
2626 INDUSTRIAL PARKWAY
ELKHART, INDIANA

Drawn	JEH
Approved	WBP
Date	JULY 1997
Proj.No.	1092-9701-01
Sheet No.	2.0.0

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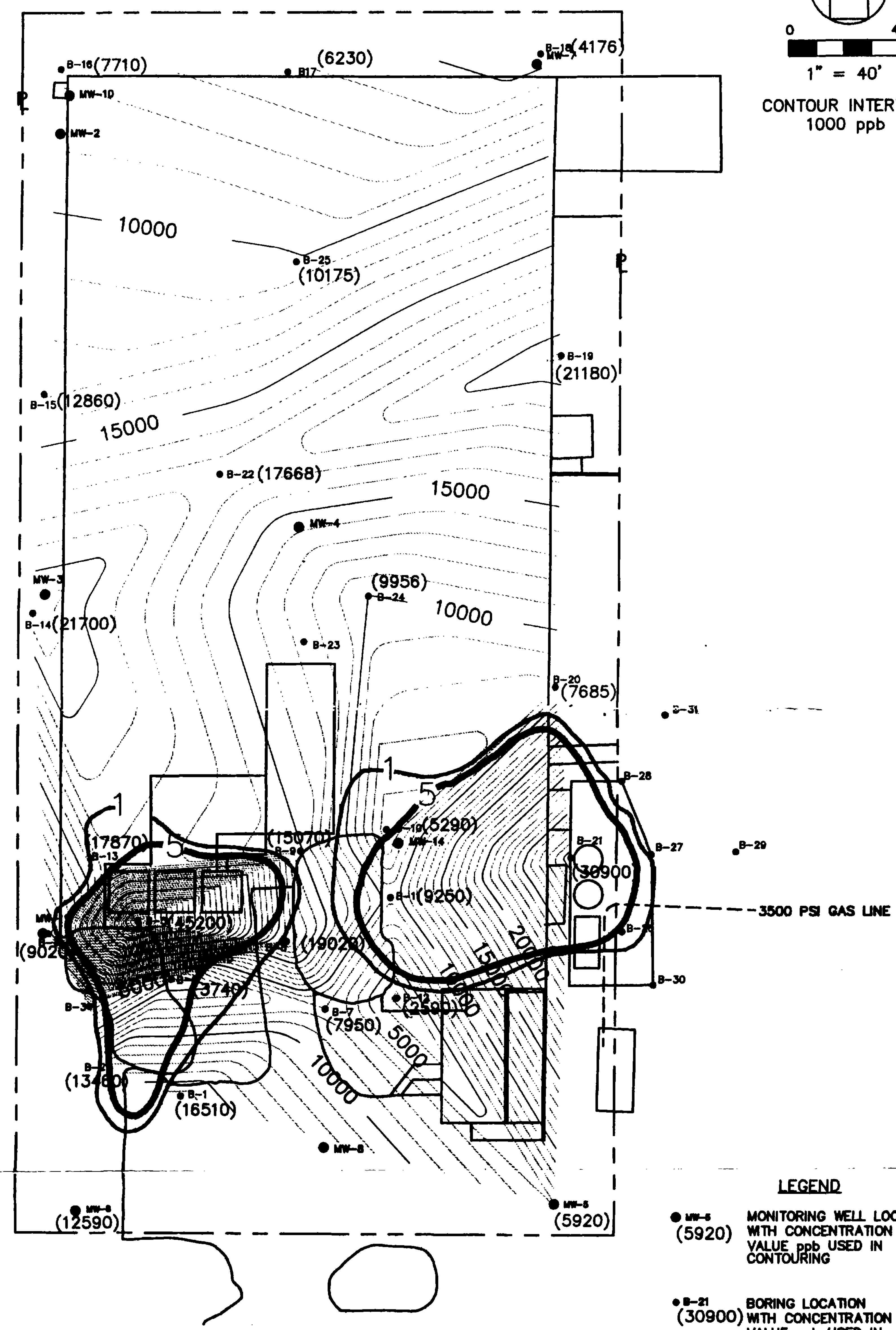
N

0 40'

1" = 40'

CONTOUR INTERVAL: 1000 ppb



LEGEND

MW-5 (5920) MONITORING WELL LOCATION WITH CONCENTRATION VALUE ppb USED IN CONTOURING

B-21 (30900) BORING LOCATION WITH CONCENTRATION VALUE ppb USED IN CONTOURING

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HALOGENATED COMPOUNDS IN GROUNDWATER BETWEEN WATER TABLE AND 23' BELOW GRADE BASED ON HYDROPUNCH SAMPLES COLLECTED IN SPRING 1989

ACCRA PAC – WARNER BAKER SITE
2626 INDUSTRIAL PARKWAY
ELKHART, INDIANA

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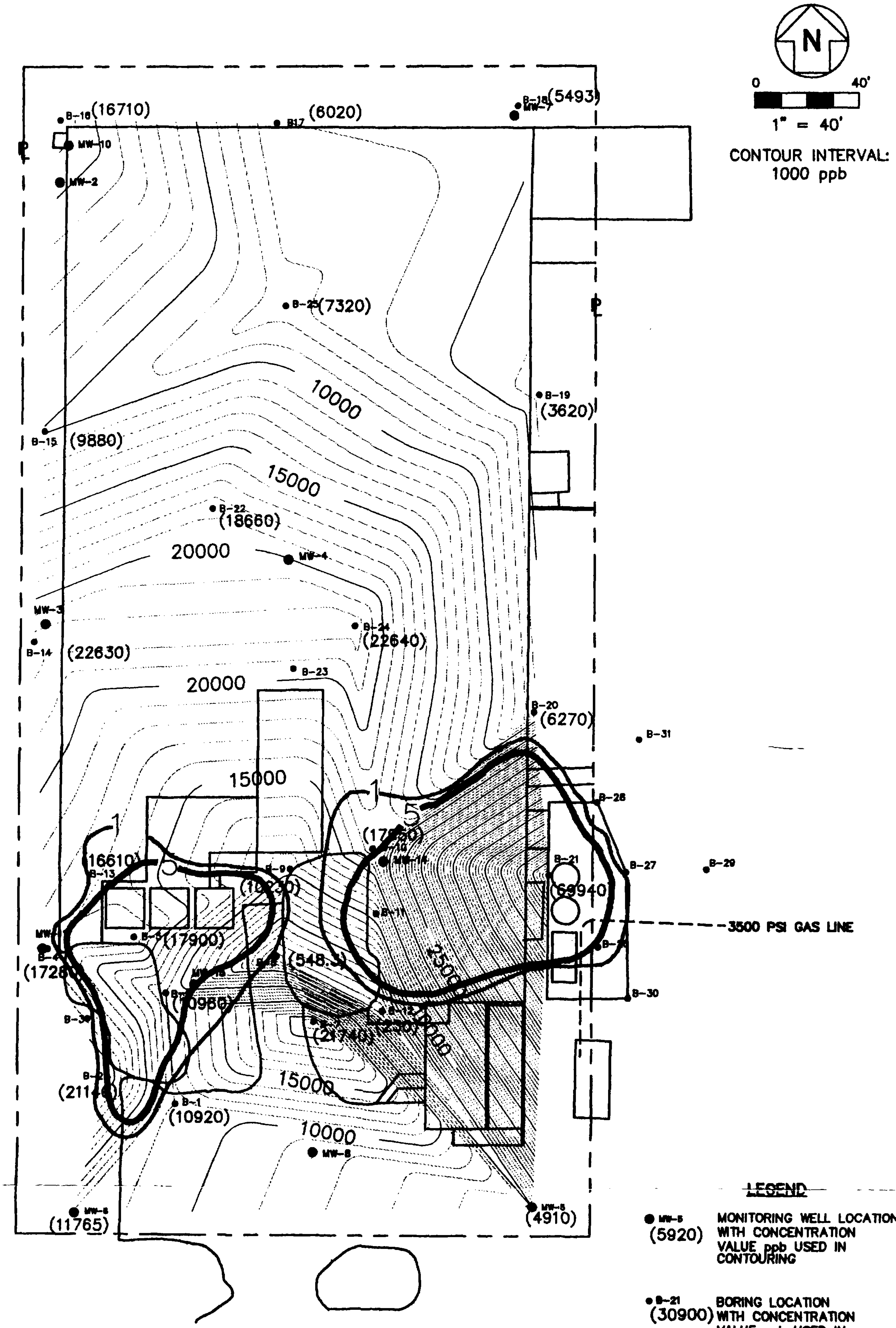
Proj.No.	1092-9701-01
Sheet No.	2.1.0



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MW-5 (5920) MONITORING WELL LOCATION WITH CONCENTRATION VALUE ppb USED IN CONTOURING

B-21 (30900) BORING LOCATION WITH CONCENTRATION VALUE ppb USED IN CONTOURING

EIS ENVIRONMENTAL ENGINEERS, INC. 1701 North Ironwood Dr. . South Bend, IN 46635 Tele. (219) 277-5715 Fax. (219) 272-1376	HALOGENATED COMPOUNDS IN GROUNDWATER BETWEEN 23.1' AND 38' BELOW GRADE BASED ON HYDROPUNCH SAMPLES COLLECTED IN SPRING 1989 ACCRA PAC – WARNER BAKER SITE 2626 INDUSTRIAL PARKWAY ELKHART, INDIANA	Drawn JEH Approved WBP Date JULY 1997 Proj.No. 1092-9701-01 Sheet No. 2.2.0

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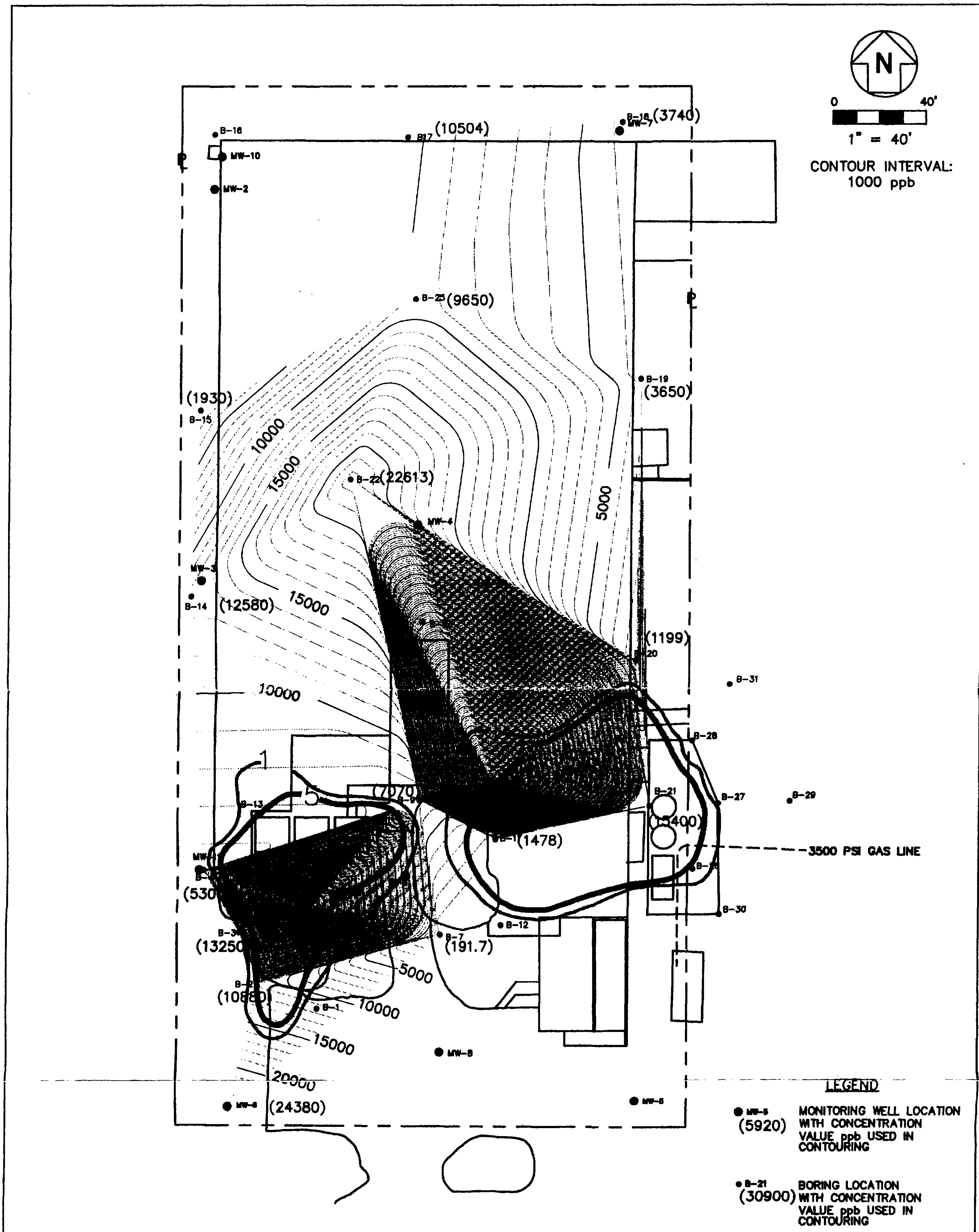

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HALOGENATED COMPOUNDS IN GROUNDWATER
BETWEEN 38.1' AND 53' BELOW GRADE
BASED ON HYDROPUNCH SAMPLES COLLECTED IN SPRING 1989

ACCRA PAC – WARNER BAKER SITE
2626 INDUSTRIAL PARKWAY
ELKHART, INDIANA

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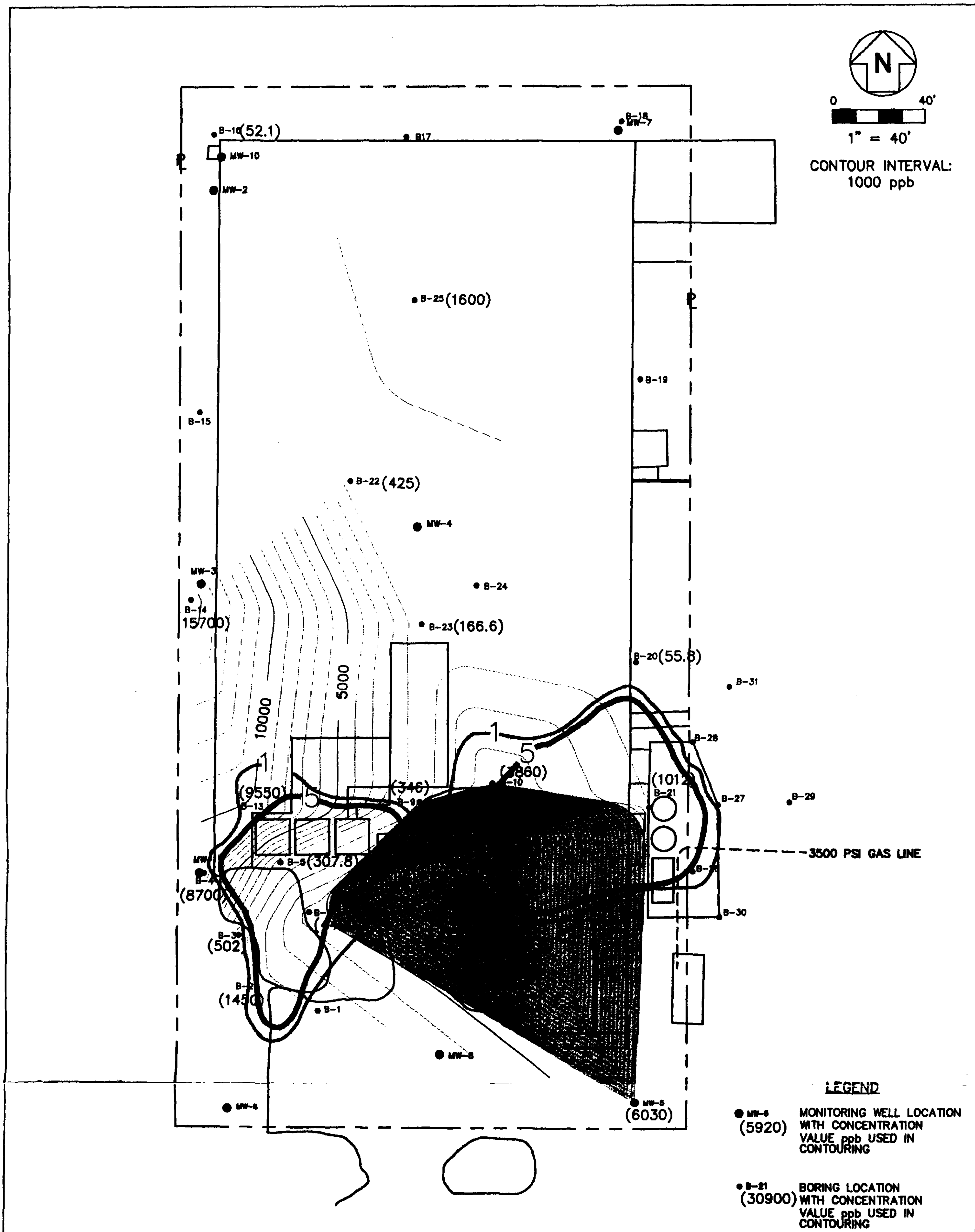

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HALOGENATED COMPOUNDS IN GROUNDWATER
BETWEEN 53.1' AND 68.1' BELOW GRADE
BASED ON HYDROPUNCH SAMPLES COLLECTED IN SPRING 1989

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ELKHART, INDIANA

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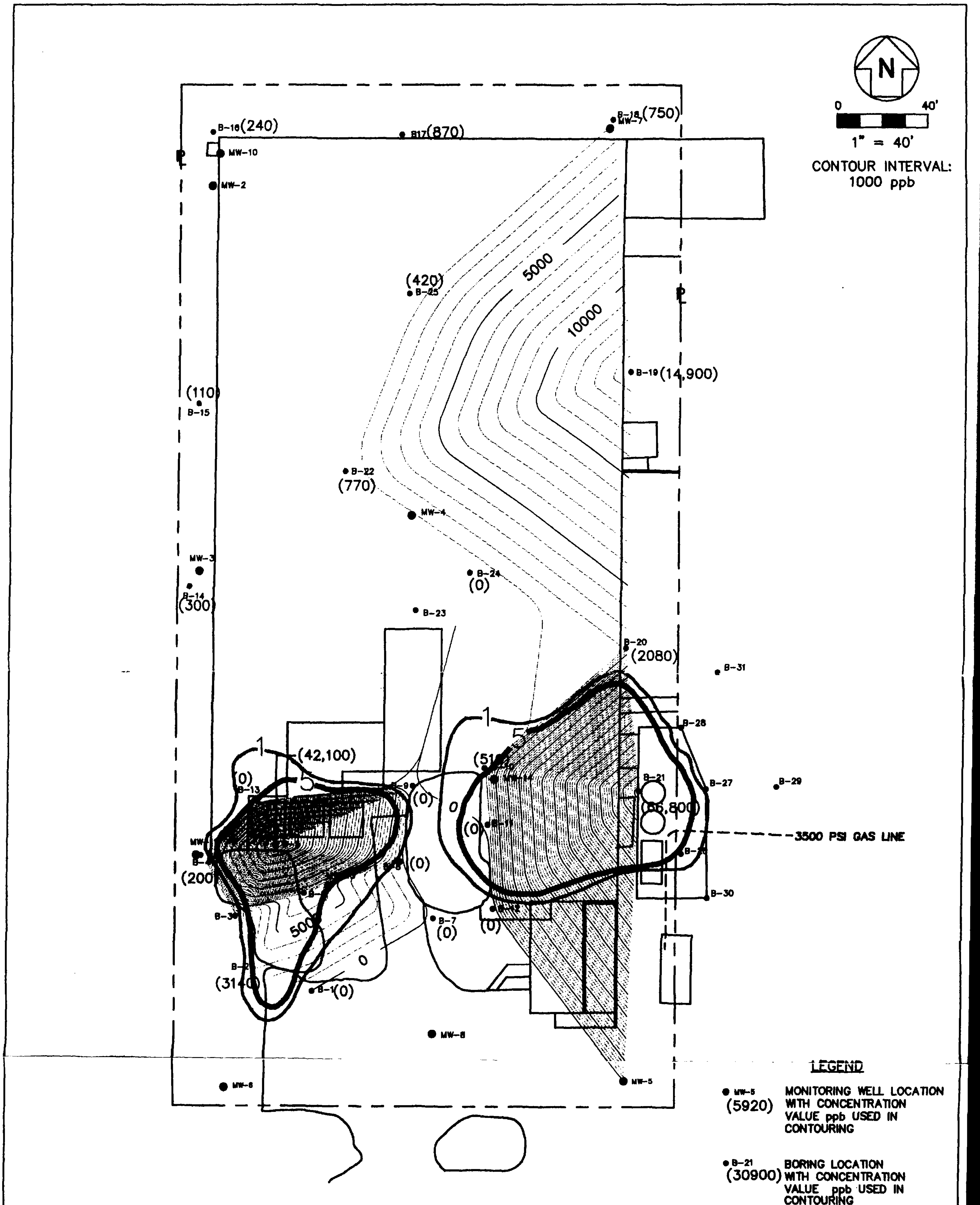

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NON-HALOGENATED COMPOUNDS IN GROUNDWATER
BETWEEN WATER TABLE AND 23' BELOW GRADE
BASED ON HYDROPUNCH SAMPLES COLLECTED IN SPRING 1989

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2626 INDUSTRIAL PARKWAY
ELKHART, INDIANA

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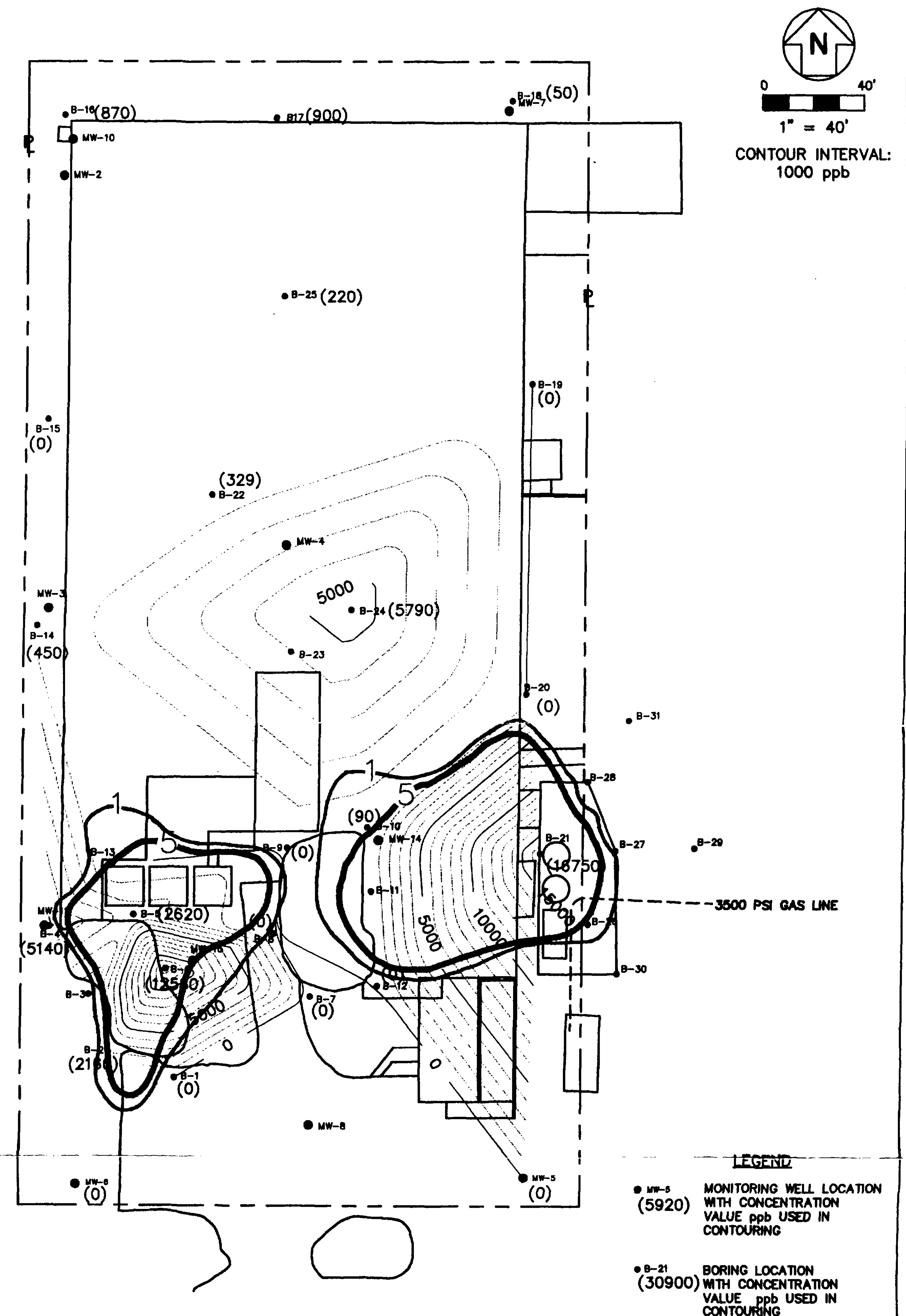

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NON-HALOGENATED COMPOUNDS IN GROUNDWATER
BETWEEN 23.1' AND 38.' BELOW GRADE
BASED ON HYDROPUNCH SAMPLES COLLECTED IN SPRING 1989

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2626 INDUSTRIAL PARKWAY
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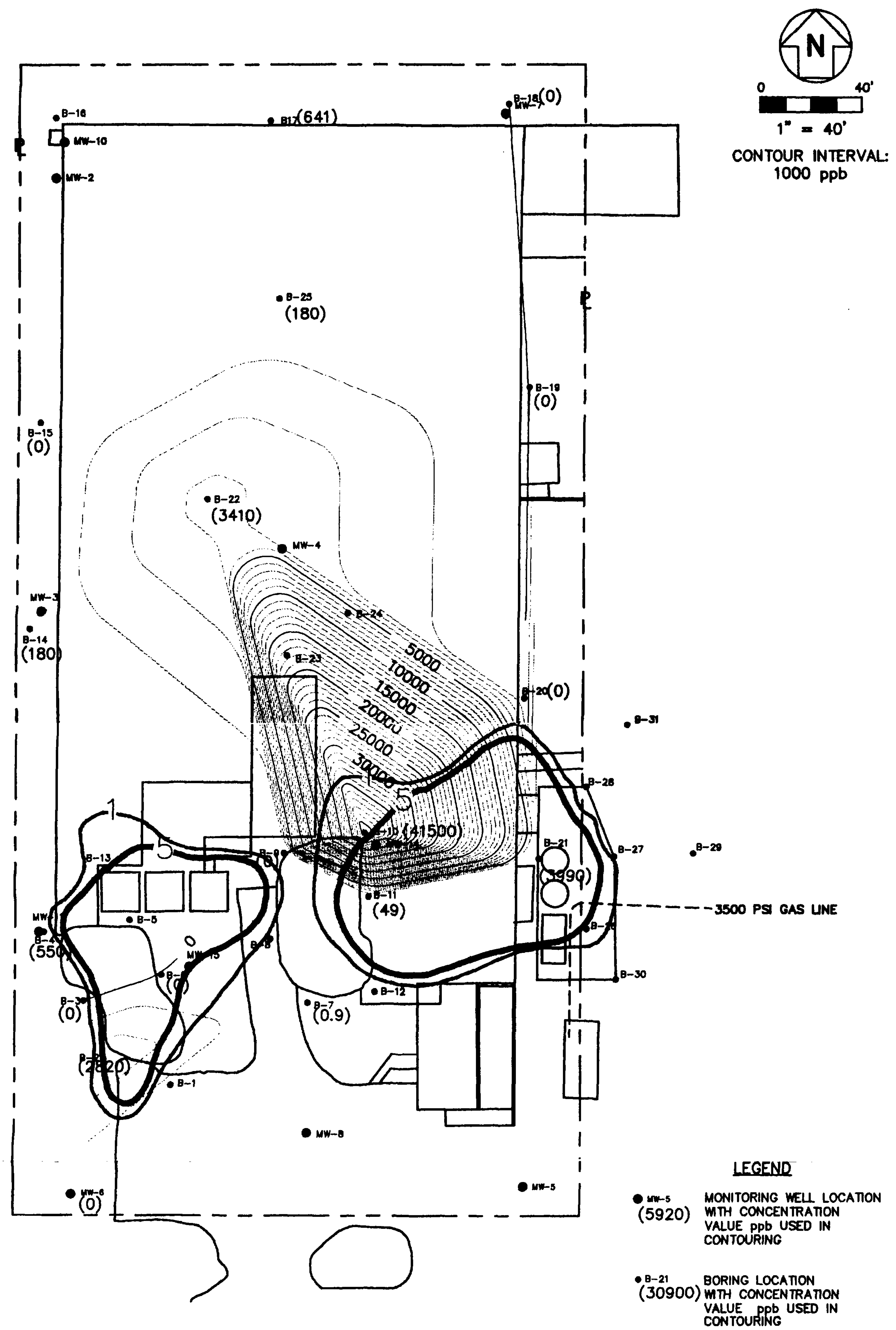

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NON-HALOGENATED COMPOUNDS IN GROUNDWATER
BETWEEN 38.1' AND 53' BELOW GRADE
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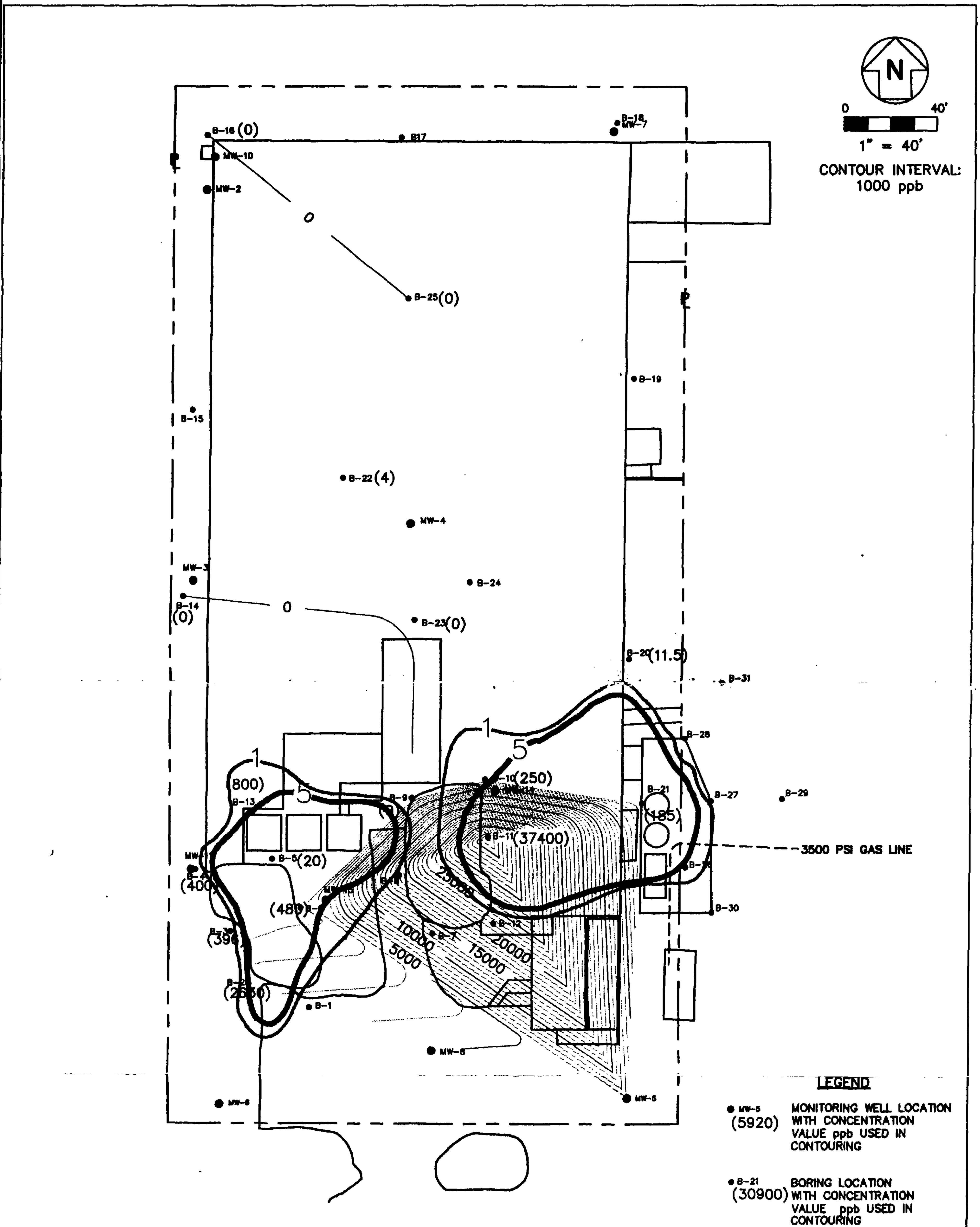
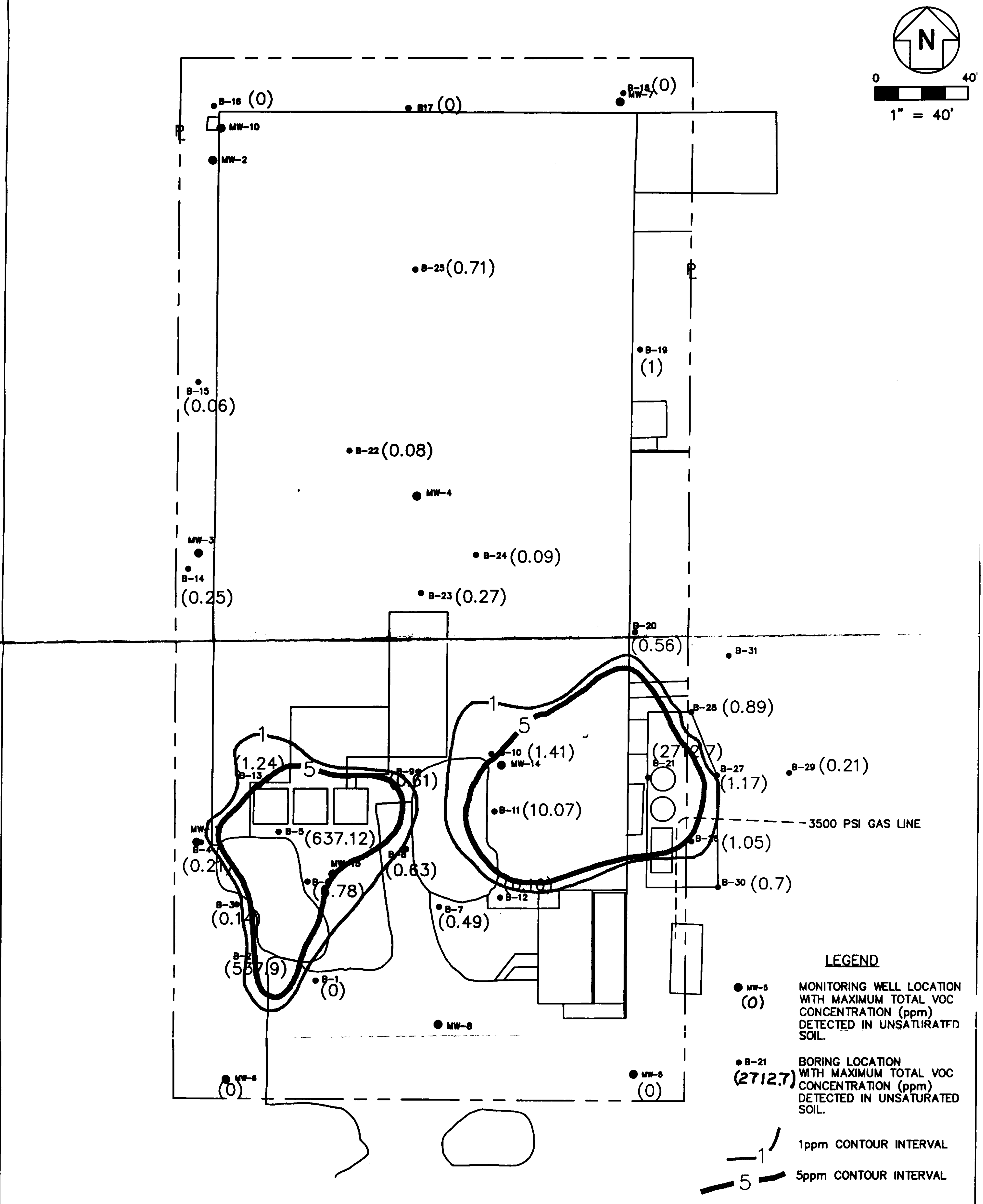


EIS ENVIRONMENTAL ENGINEERS, INC. 1701 North Ironwood Dr. . South Bend, IN 46635 Tele. (219) 277-5715 Fax. (219) 272-1376	NON-HALOGENATED COMPOUNDS IN GROUNDWATER BETWEEN 53.1' AND 68.1' BELOW GRADE BASED ON HYDROPUNCH SAMPLES COLLECTED IN SPRING 1989 ACCRA PAC – WARNER BAKER SITE 2626 INDUSTRIAL PARKWAY ELKHART, INDIANA	Drawn JEH Approved WBP Date JULY 1997 Proj.No. 1092-9701-01 Sheet No. 2.8.0



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HORIZONTAL DISTRIBUTION OF TOTAL VOC IN UNSATURATED SOILS TAKEN FROM FIGURE 4.3 FROM INVESTIGATION REPORT DATED SEPT. 1990

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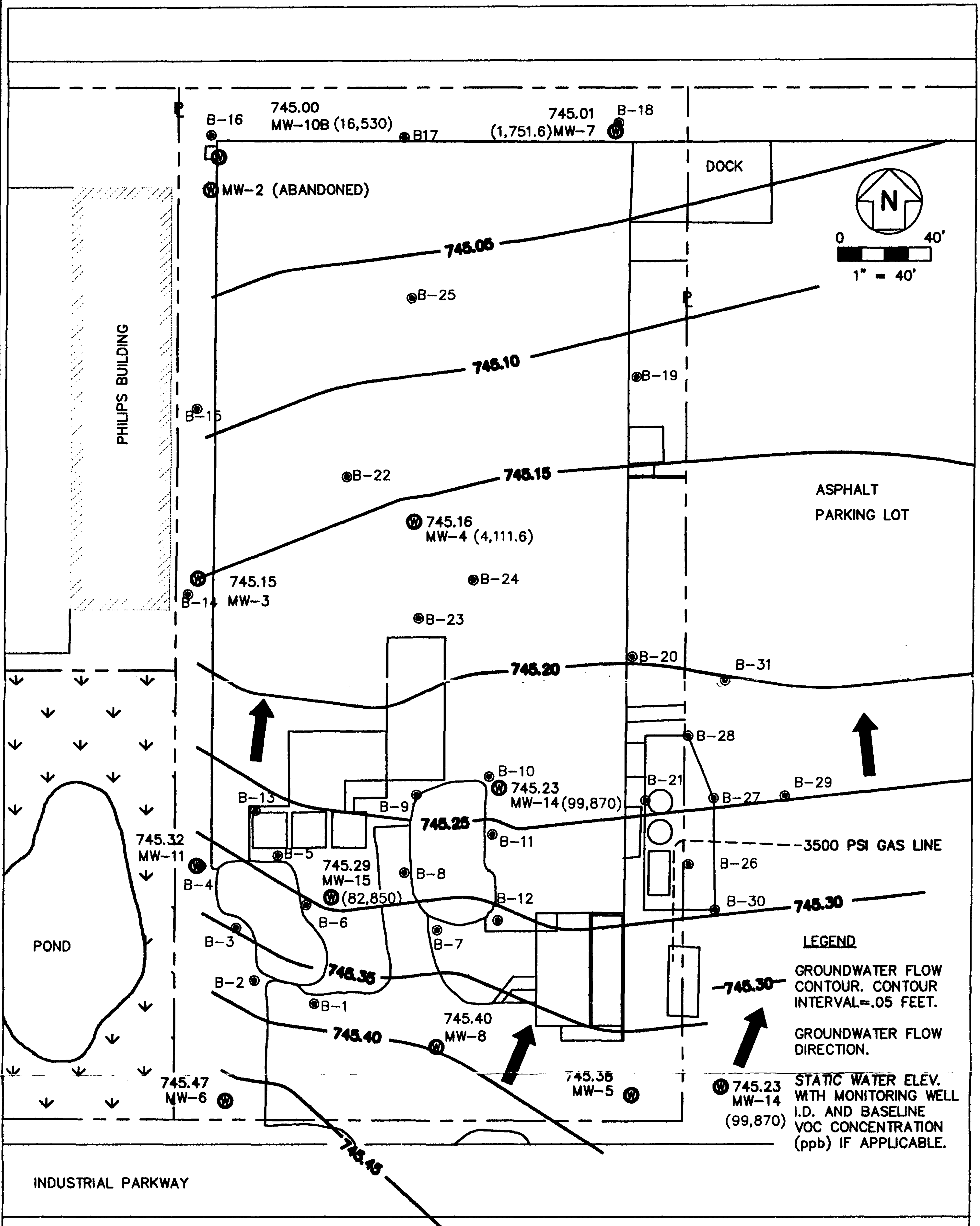

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GROUNDWATER FLOW DIRECTION
AND BASELINE VOC CONCENTRATIONS
IN GROUNDWATER BASED ON
SEPTEMBER 30, 1996 DATA

ACCRA PAC – WARNER BAKER SITE
2626 INDUSTRIAL PARKWAY
ELKHART, INDIANA

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Sheet No.	3.2.0

APPENDIX B

SPECIFICATIONS

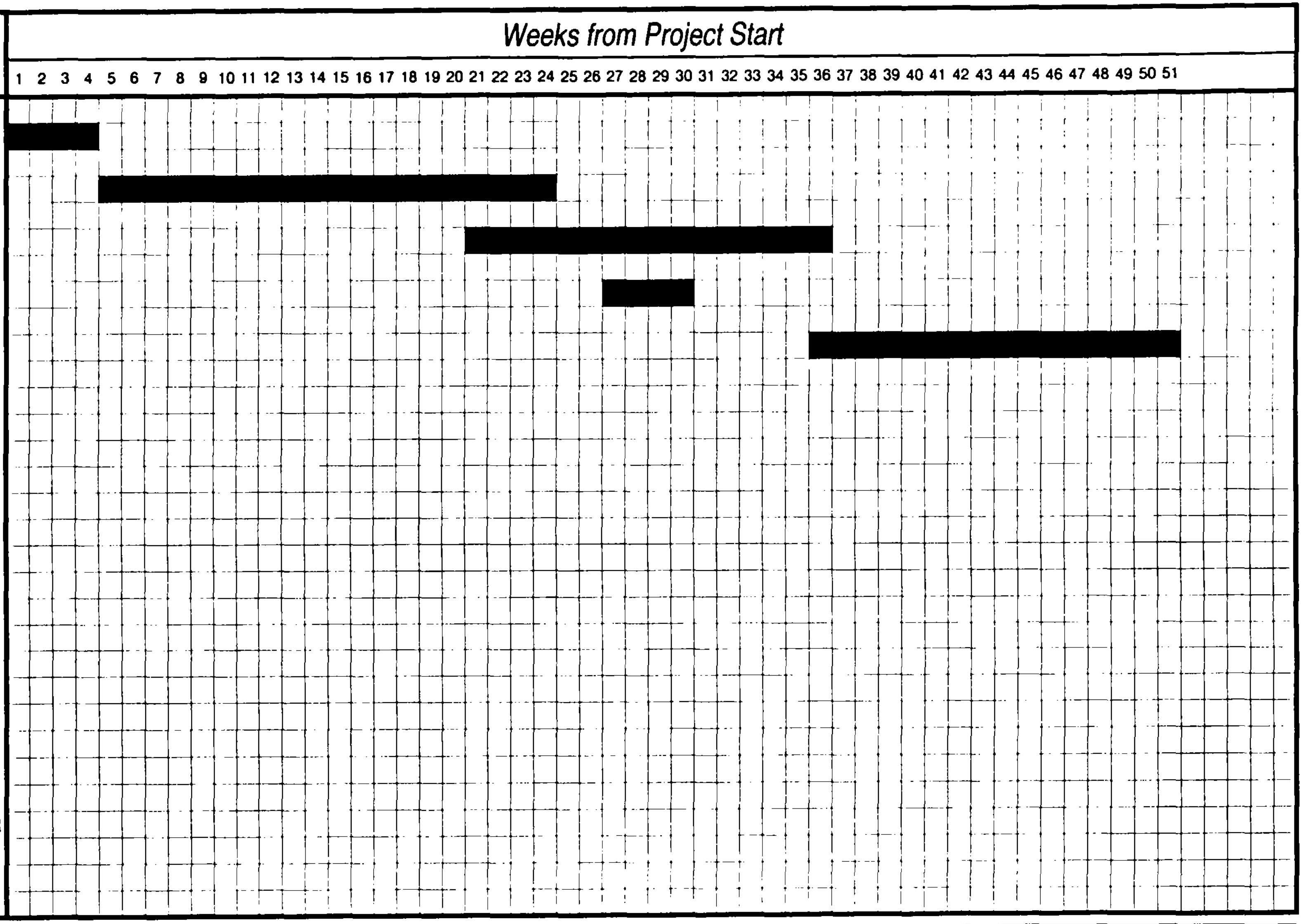
LIST OF SPECIFICATIONS

<u>Biovent/SVC System</u>	
1. Vacuum Blower	• Will use manufacturer's standard equipment. • Need pressure and flow from final design. • If skid mounted, will use schematic to specify components.
2. Piping Construction	• PVC piping – no spec – will bid to drawings
3. Building	• Spec only size – (anticipate backyard shed). Buy on installed cost.
4. Instruments (vacuum gauges)	• Standard items – catalog purchase.
5. Well Installation	• Use existing EIS standards.
<u>Sparging System</u>	
1. Blower or Compressor	• Will use manufacturer's standard equipment. • Need pressure and flow from final design. • If skid mounted, will use schematic to specify components.
2. Piping construction	• PVC piping – no spec – will bid to drawings.
3. Instruments (pressure and flow)	• Standard items – catalog purchase.
4. Sparge Point Installation	• To be determined at final design.

APPENDIX C

SCHEDULES

TASKS	Span, Wks
Preliminary Design Approval	4
Final Design & Approval	20
Cleanup Work Plan & Aprvl.	16
Health & Saftey Plan	4
Bioventing/SVE Construction	15
Bioventing/SVE Operation	TBD
Biosparge Pre-construction	12
Biosparge Construction	6
Biosparge Operation	TBD
Pump & Treat Pump Test	8
Pump & Treat Design	4
Pump & Treat Construction	20
Pump & Treat Operation	TBD
Shut Down	1 YR
Monitoring	1YR



LEGEND

NOT TO SCALE

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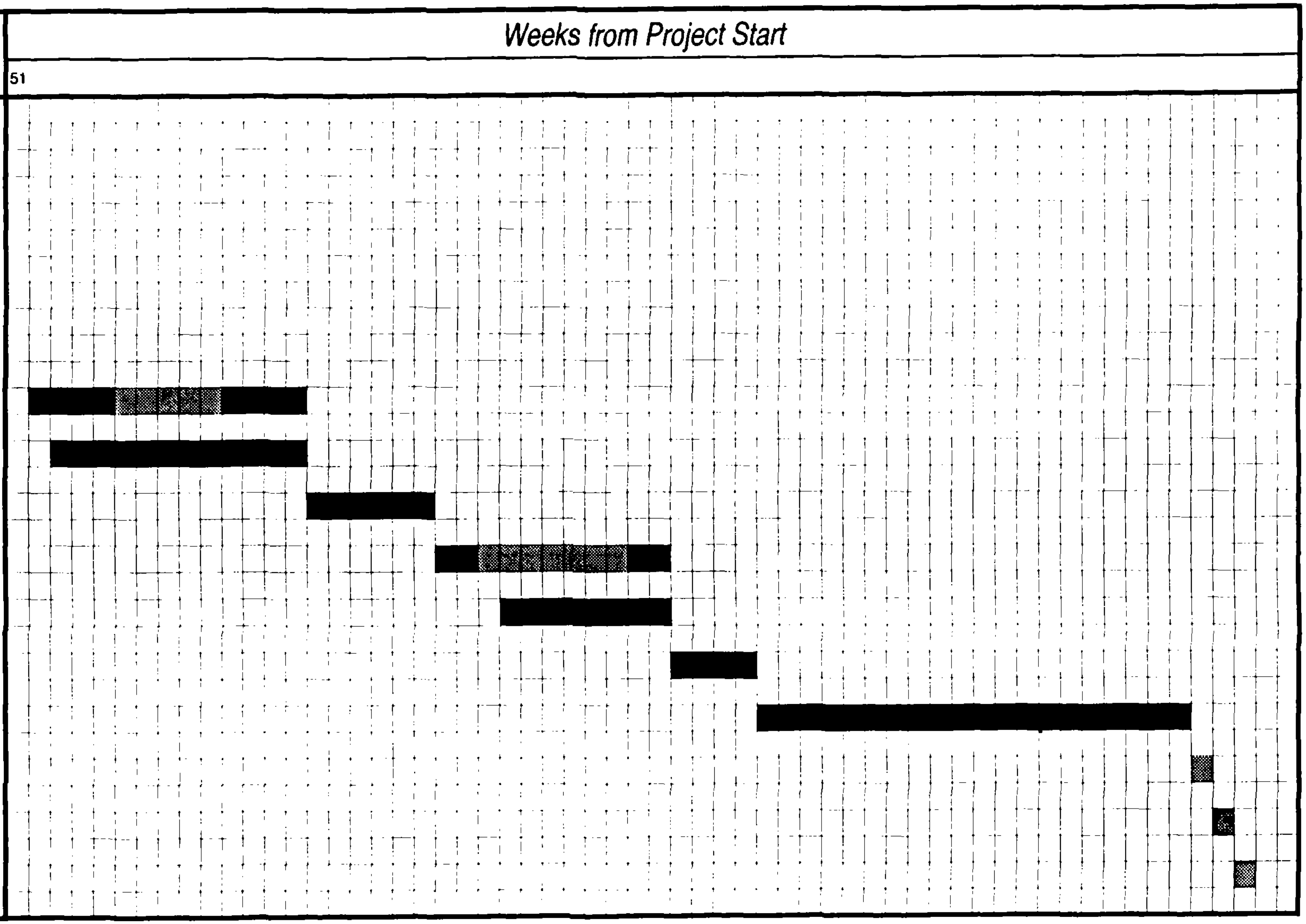
ACCRA PAC/WARNER BAKER SITE
REMEDIATION IMPLEMENTATION
MASTER SCHEDULE

Page 1 of 3

7/30/97, master

TASKS	Span, Wks
Preliminary Design Approval	4
Final Design & Approval	20
Cleanup Work Plan & Apprl.	16
Health & Saftey Plan	4
Bioventing/SVE Construction	15
Bioventing/SVE Operation	TBD
Biosparge Pre-construction	12
Biosparge Construction	6
Biosparge Operation	TBD
Pump & Treat Pump Test	8
Pump & Treat Design	4
Pump & Treat Construction	20
Pump & Treat Operation	TBD
Shut Down	1 YR
Monitoring	1YR

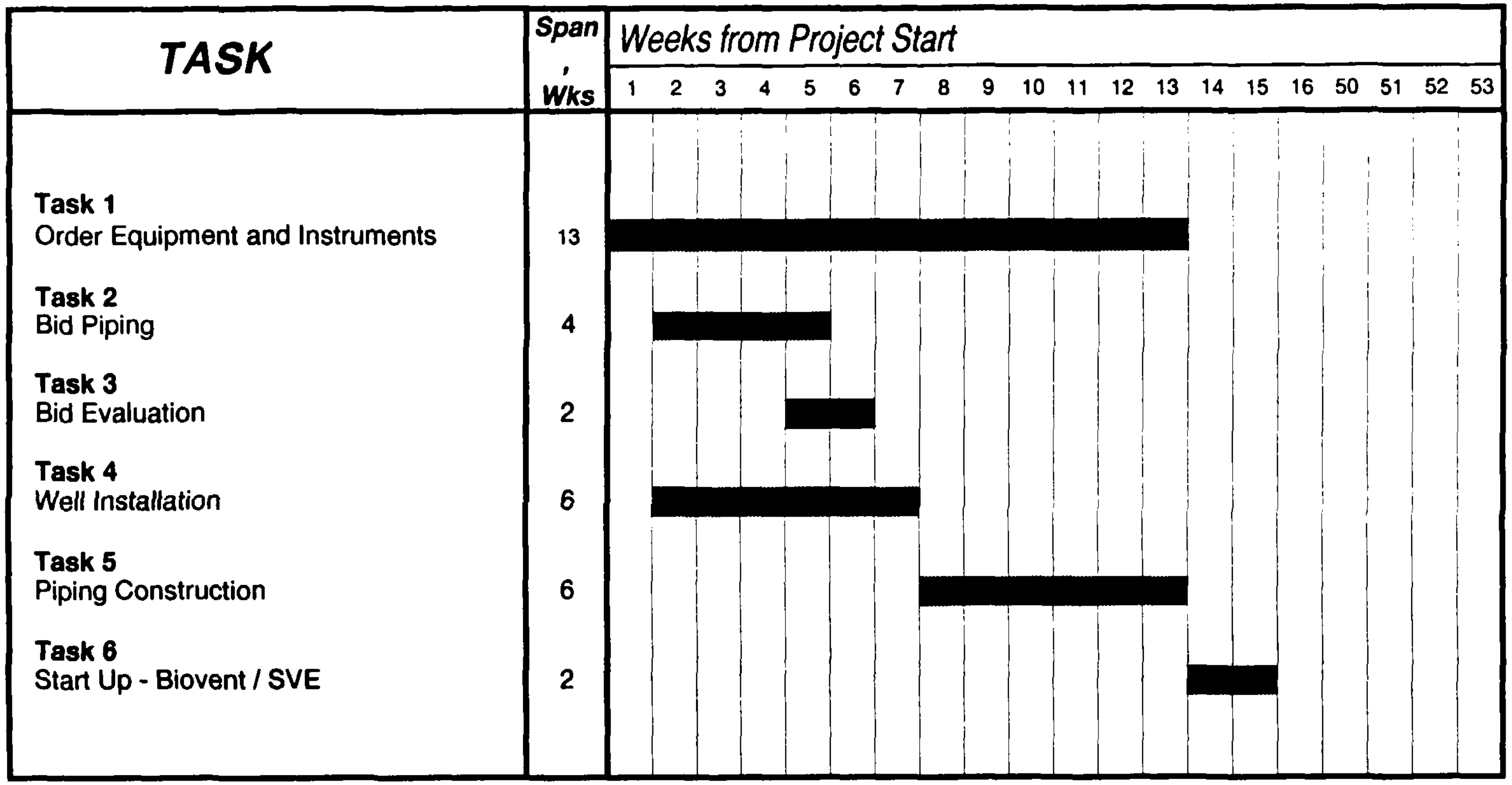


LEGEND

NOT TO SCALE

ACCRA PAC/WARNER BAKER SITE
REMEDIATION IMPLEMENTATION
MASTER SCHEDULE

7/30/97, master

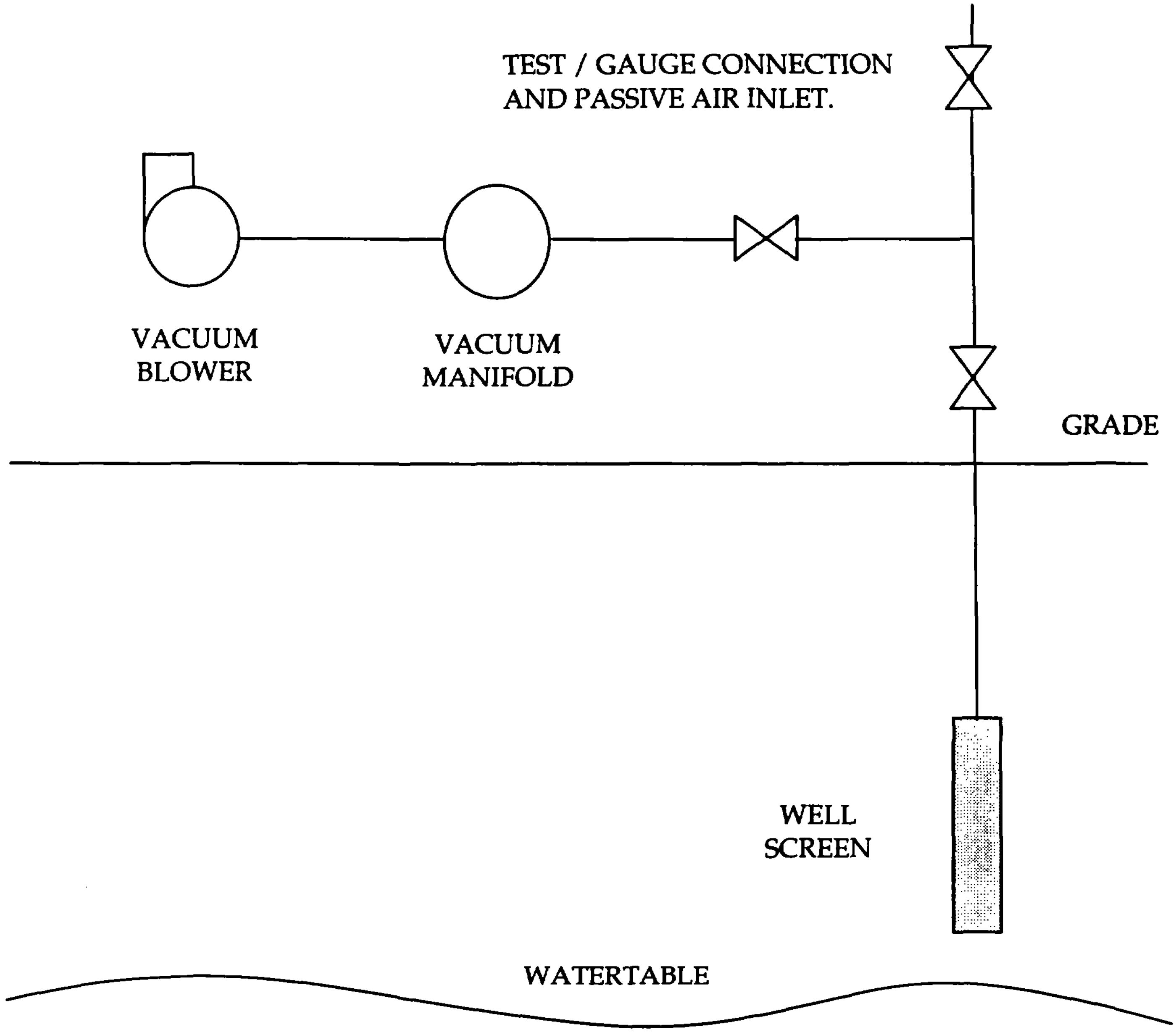


ACCREA PACE/WARNER BAKER SITE
BIOVENTING/SOIL VAPOR EXTRACTION
PRELIMINARY CONSTRUCTION SCHEDULE

Page 3 of 3

APPENDIX D

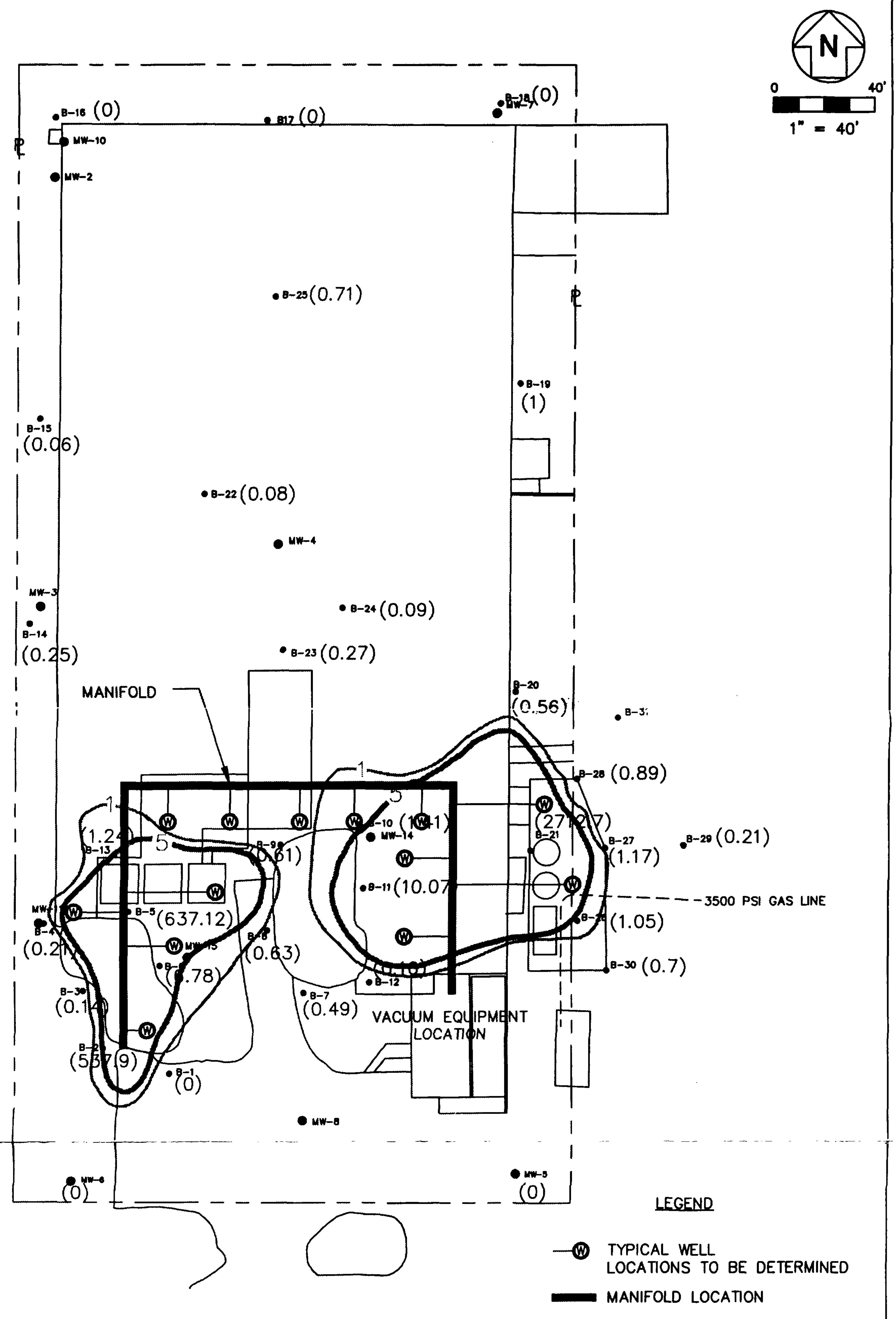
PLANS, DRAWINGS AND SKETCHES



EIS Environmental Engineers, Inc.
1701. N. Ironwood Drive
South Bend, Indiana 46635

SCHEMATIC OF
BIOVENTING / SVE SYSTEM
ACCRA PAC/WARNER BAKER SITE
2626 INDUSTRIAL PAKKWAY
ELKHART, INDIANA

SHT. 4.1.0



EIS ENVIRONMENTAL ENGINEERS, INC. 1701 North Ironwood Dr. . South Bend, IN 46635 Tele. (219) 277-5715 Fax. (219) 272-1376	PRELIMINARY LAYOUT OF BIOVENTING / SVE SYSTEM ACCRA PAC – WARNER BAKER SITE 2626 INDUSTRIAL PARKWAY ELKHART, INDIANA	**Drawn** JEH **Approved** WBP **Date** JULY 1997 **Proj.No.** 1092-9701-01 **Sheet No.** 5.1.0